PYRAMID TECHNICAL CONSULTANTS

Pyramid Beam Analyzer User Manual

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Section 1

1. Safety

CAUTION ! The MLRV will become temporarily radioactive after use. A qualified radiation protection officer should survey the device before handling, and storage. Normal procedures for the handling of radioactive material should be observed.

CAUTION ! It is recommended that the device not be handled for 20 minutes after irradiation, after which it should be surveyed for safe levels of radiation.

NOTE: The MLRV is constructed primarily of natural copper. Decay proceeds with a time constant of 9.7 minutes (CU62), and a time constant of 12 hours (CU64). Residual activity is normally very low after 48 hours, but the activity level should be checked before shipping.

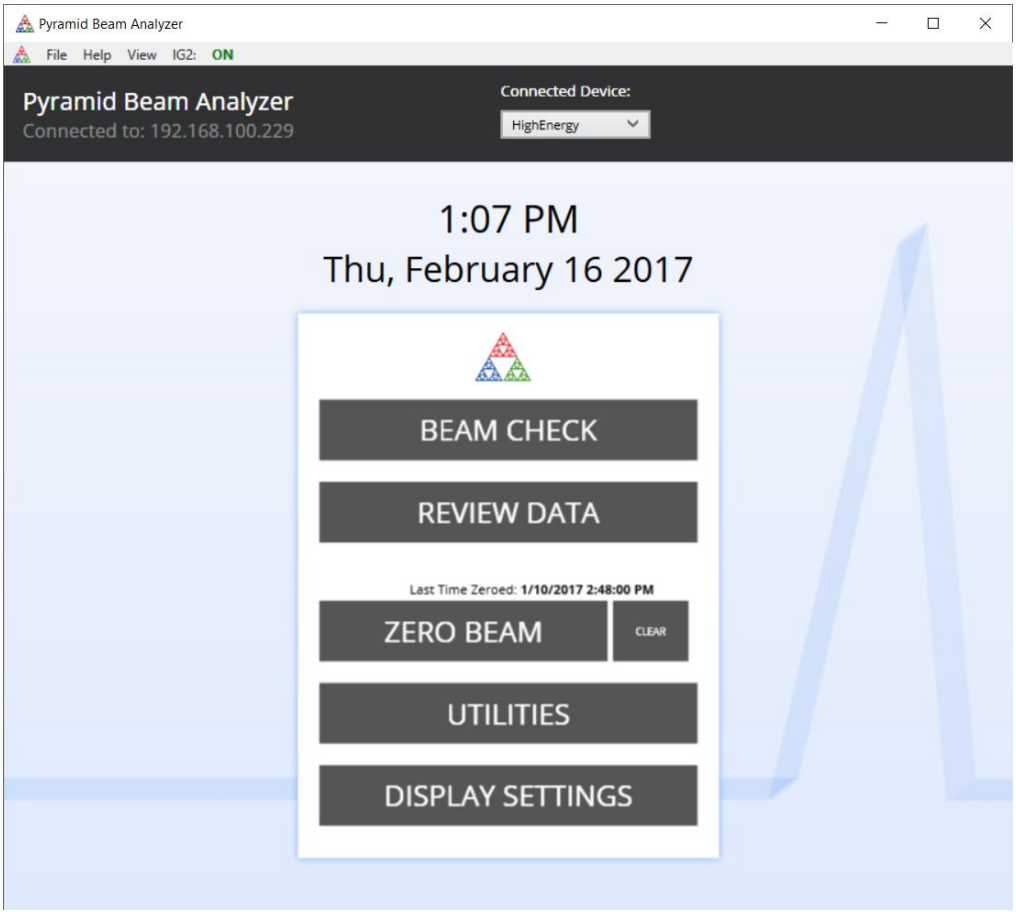
CAUTION ! Do not inject beam into the MLRV without first making sure it is connected to the readout electronics. Failure to do this can result in damage to the unit.

Section 2

2. Overview

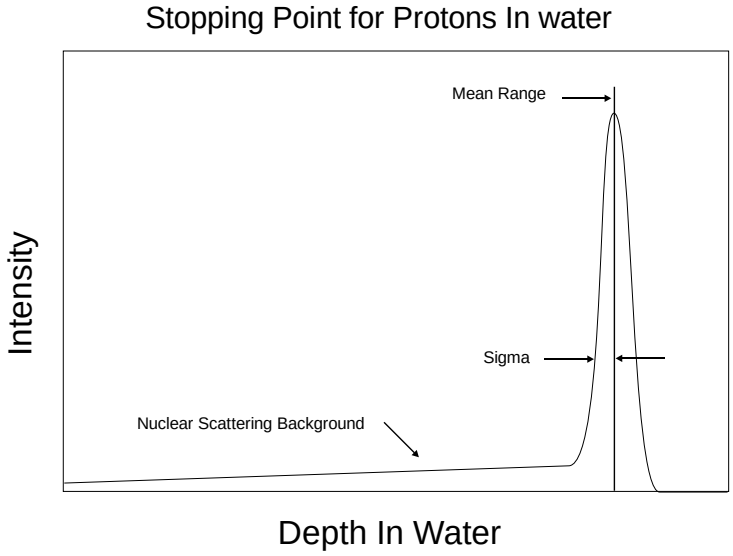
Pyramid Beam Analyzer (PBA) is designed to work with Pyramid's Multilayer Range Verifier (MLRV) detector and support electronics. PBA allows the user to quickly and conveniently collect and compare measurements of beam range. This measurement provides a highly stable and sensitive indication that beam conditions have remained unchanged since the last full calibration. The system also provides a good measurement of absolute energy and energy spread.

PBA provides tools for saving reference files for later comparison with daily measurements, with a simple database for organizing data



2.1. Principles of Operation

As a high-energy proton passes through matter, it gradually loses energy and comes to a stop. The distance the proton penetrates is its *range*. For a beam of protons of a single energy, the actual stopping point has a natural spread which can be accurately predicted. Any energy spread in the beam will add to this spread. There will also be some fraction of the beam that will undergo nuclear collisions and will have a lesser depth of penetration. A perfect beam passing through water will result in a distribution in depth that looks something like this:



The important features of the depth distribution of protons in water. This plot represents a beam with zero initial energy spread. The mean range is a direct indication of the initial energy. The spread in range ("sigma") and the nuclear background arise from the interaction of the proton beam with the stopping medium. Once this "pristine" distribution is known, any deviations are a measure of how far the initial beam deviates from the ideal. Note that the general shape is the same for protons in copper.

2.1.1. Mean Energy

The mean position of the peak is a predictable function of the initial beam energy. Different physics models will typically predict that relationship within 1%. We can therefore use the position of the peak of the depth distribution to determine the initial energy with good accuracy.

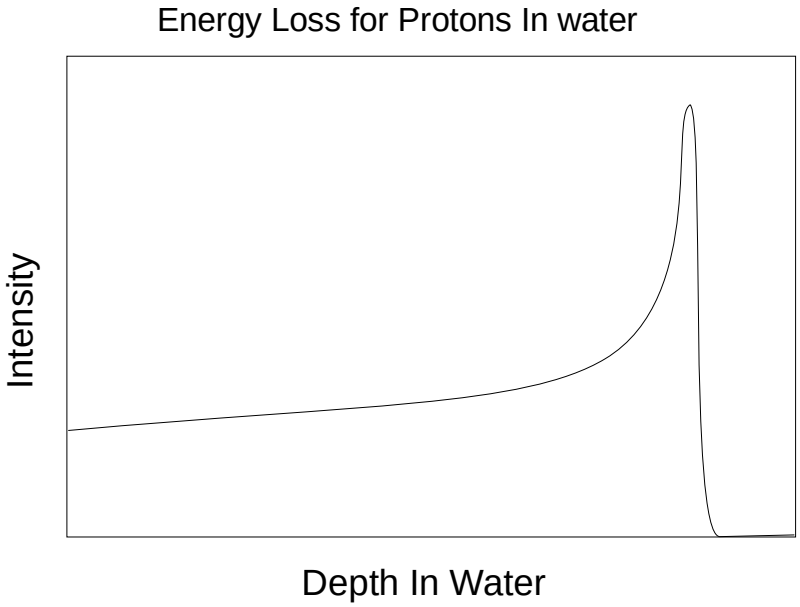
The MLRV uses depth in copper to predict beam energy. The advantage of using copper (as opposed to water) is that the copper detector is extremely stable, and therefore the measurement is highly repeatable. Although absolute energy will be measured to about 1%, repeatability is on the order of 0.1% This feature makes the MLRV an ideal instrument for detecting changes in a beam delivery system.

To compensate for very small variations between different MLRV units, each MLRV has an associated map file that contains precise compensation data. For users that utilize more than one MLRV, it is

important that the correct device has been selected before acquisition, and that the correct files are associated with each MLRV.

It is important to understand the difference between the depth distribution and the depth/dose profile, or Bragg Curve. Both distributions are determined by the beam energy. While the range curve shows the distribution of penetration depths of the protons, the Bragg Curve represents the energy deposited as a function of depth. A 230 MeV proton in water will end up at a depth of 30 centimeters, but it will deposit energy all along its path. The range and dose profiles can be used to predict each other.

One parameter that is widely used is "D80", which is the point in the depth/dose curve where the distal edge rises to 80% of the peak value. This position corresponds to the mean range of the protons.



2.1.2. Other Beam Parameters

TOTAL CHARGE:

The device measures deposited charge directly, and so provides the function of a monolithic Faraday cup. In general, we will want to ignore the charge from the first plate or two, where the charge transfer is complex. The PBA software allows this exclusion, and provides the total deposited charge under the curve.

ENERGY SPREAD:

PBA can estimate the shape of an ideal (single energy) beam range distribution. It can indicate if there is any additional spread to the distribution, which can indicate spread in the beam energy.

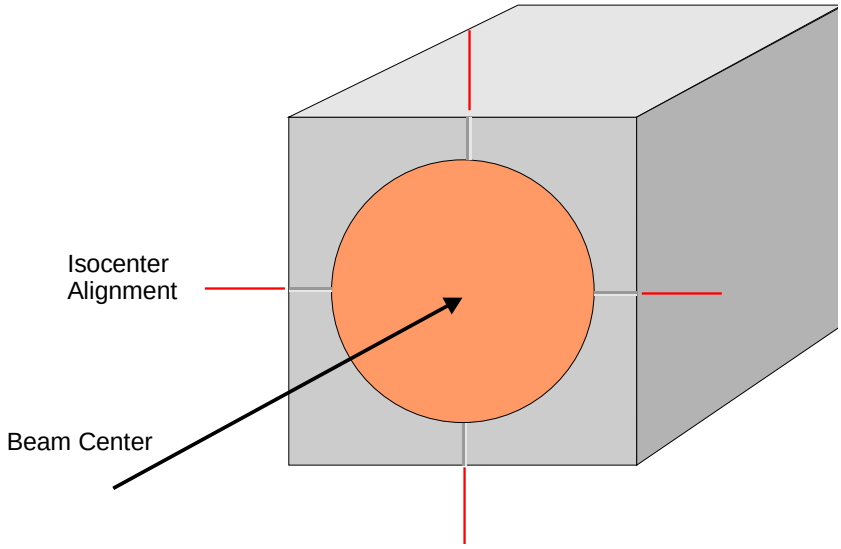
BACKGROUND TO PEAK:

PBA will provide a measurement of the amount of beam that is in the primary peak, compared to the total charge under the curve. Changes in this parameter can indicate that the beamline has developed additional scattering.

2.1.3. Notes for best performance

DEVICE POSITIONING:

Position the MLRV in the beam path, with the front window facing the beam. The device should be centered and parallel to the beam. The fiducial marks on the device can be used to align with a laser crosshair system.



MEASUREMENT CONDITIONS:

If there is a choice of measurement current, it is best to select the largest current available. In the case of a synchrotron, the spill rate can typically be adjusted. It is best to use currents of 5 nA and greater if possible.

PULSED BEAMS:

Pulsed beams can have very high instantaneous current. The I128 electronics is limited to about 600 nA. If you have a pulsed beam with currents higher than this value, it will be necessary to insert a current low-pass filter into the electronic chain. Contact Pyramid for this option.

HEAVIER IONS:

The standard calibration table applies only to protons. The MLRV can be used with heavier ions, but a specialized calibration file will be needed. Contact Pyramid for further information.

DEVICE STORAGE:

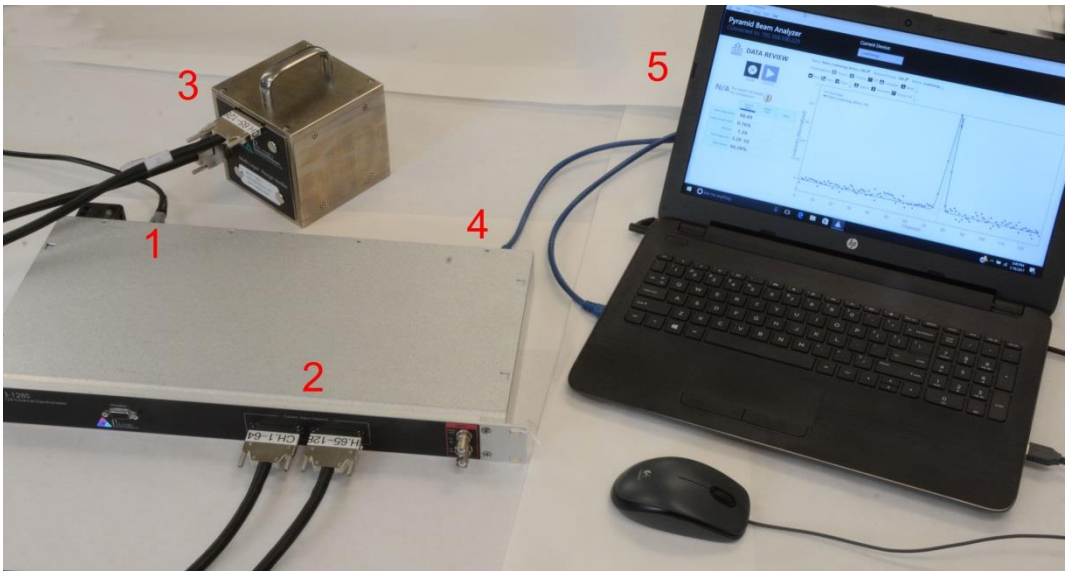
If possible, keep the MLRV connected to its electronic unit when not in use. This allows any residual trapped charge to drain from the device.

2.2. Quick Start

The quick start section is intended for users who have received the full Pyramid MLRV Kit. This kit includes a laptop PC with software pre-loaded and ready for use. If you have not received the full kit, or wish to transfer the system to another PC, please see section 6 for detailed instructions.

2.2.1. Included in your Kit

1. One Pyramid I128 electronic unit with power supply
2. Two VHDCI connection cables
3. One MLRV detector
4. One Ethernet cable
5. A laptop with the following programs installed or included
    a. Windows 10
    b. PBA
    c. PBA User Manual
    d. PTC Diagnostic G2



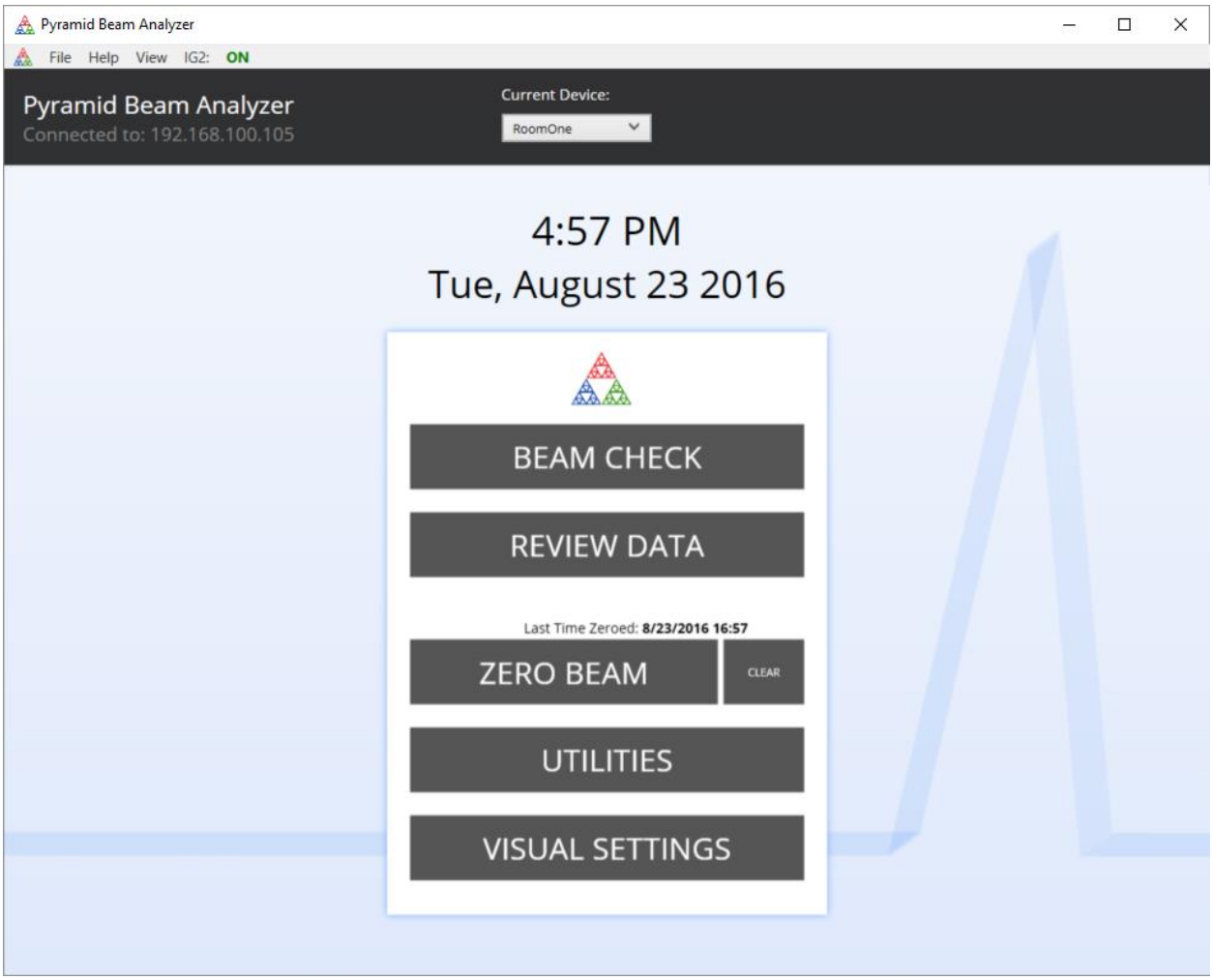
2.2.2. Kit Setup

The following instructions will get you up and running if you are starting with the full MLRV kit including laptop. If you did not get a laptop, follow the instructions provided on your USB stick:

1. Connect the power supply to the I128 device and then the power supply to external power
2. Turn on the laptop and log into username: user, password: user (at this point you may wish to change the username and password of the computer)
3. Connect the Ethernet cable from the I128 to the laptop (or alternatively connect both to the same network)
4. Connect both signal cables between the respective ports in the I128 and the MLRV device
5. Start the PBA program, shortcut located on the desktop
6. Confirm that the I128 is connected (via the display on the top left of the PBA screen). If it is not connected, follow *Section 6.1* to confirm that the network setup is correct.
7. Zero beam by following *Section 3.1*

   At this point your setup is ready to use. Follow *Chapter 2* to start a beam check.

2.2.3. Start Page



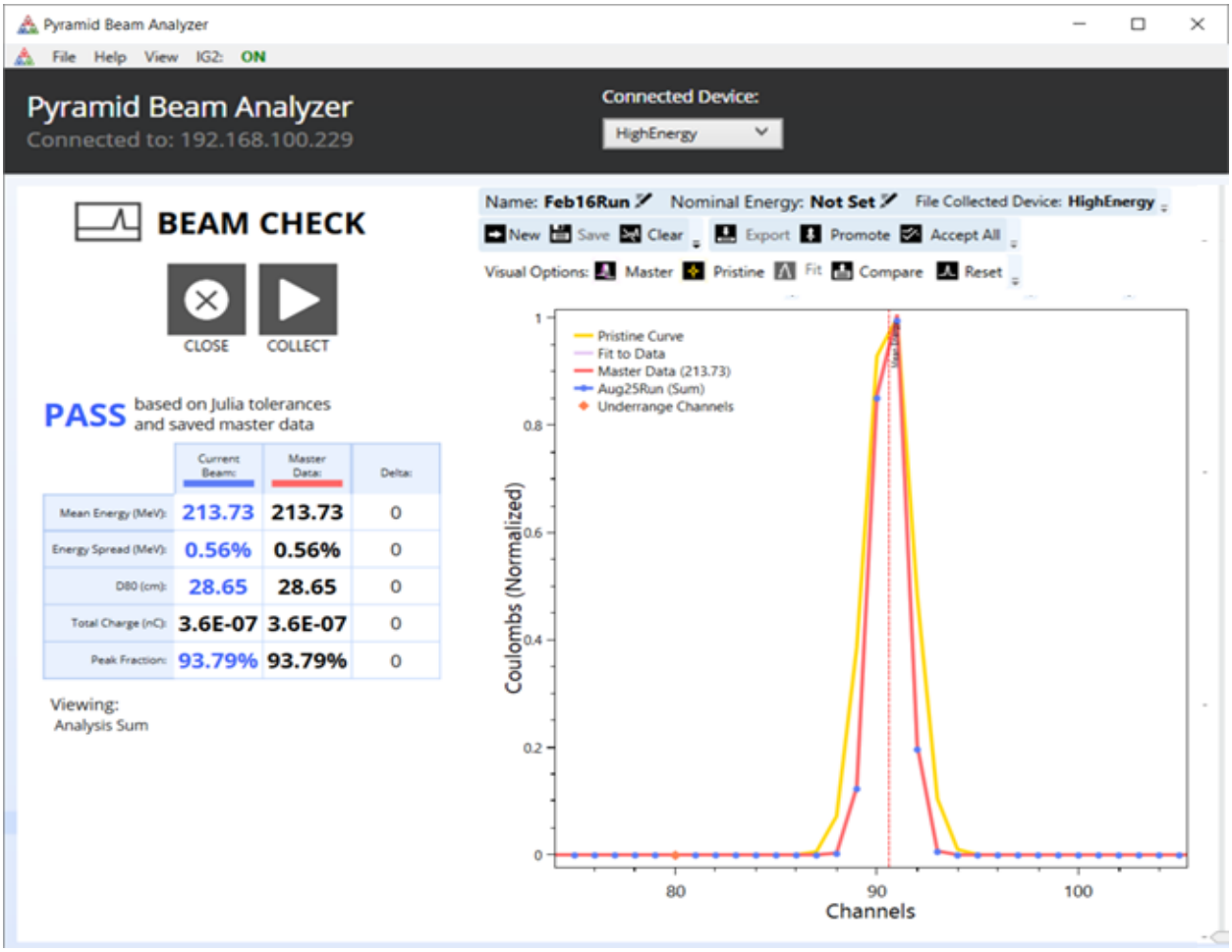
PBA will open up to the start page, where all operations begin. To return to this page, follow the "Back" or "Cancel" buttons.

- Beam Check – Collect beam data, compare and analyze data after collection
- Review Data – Review previously collected beam data
- Zero Beam – Remove background noise from beam data by zeroing the beam
- Utilities – Change user settings, tolerances, files, etc
- Display Settings – Change the visual look of the beam check plot

Section 3

3. Beam Check and Analysis

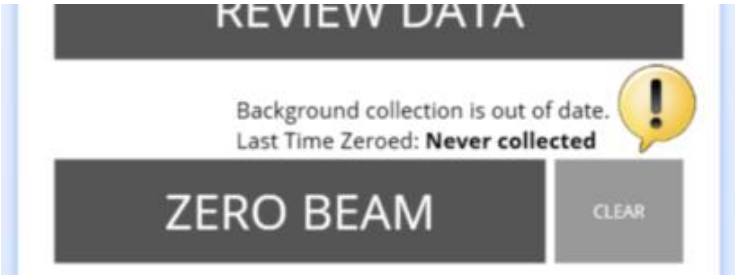
Once setup is complete, beam collection "beam check" can begin. During a beam check, incoming data from the MLRV is collected and displayed. Data collection may be paused and resumed, and cleared. Data analysis is performed on the collected data, and results are displayed. Data is also compared to reference data taken from like nominal energy beams.



3.1. Zero Beam

The very small signals from the MLRV require that any current offsets due to the readout electronics be compensated. It is recommended that the electronics be "zeroed" periodically with no beam present, so that analysis is accurate as possible. PBA can be configured to ensure that this is done by setting a maximum acceptable interval between zeroing using the tolerances list (*see section*); however, if you do not wish for this to be a required step, you may choose to leave this tolerance option blank.

3.1.1. Collect Background Noise (Zero Beam)



If background collection is out of date (as shown in the example above), you must collect new beam zeroing information by following the instructions below.

1. Click on "Zero Beam" on the start page
2. Confirm that your beam is off.
3. Click on "Start" when ready
4. Wait 10 seconds for beam zeroing to complete.
5. Review zeroing data and confirm that the beam was off during collection
6. Click on "Accept"

Note: if you were unhappy with a zeroing collection you can "Cancel" in step 6 to discount the collection.

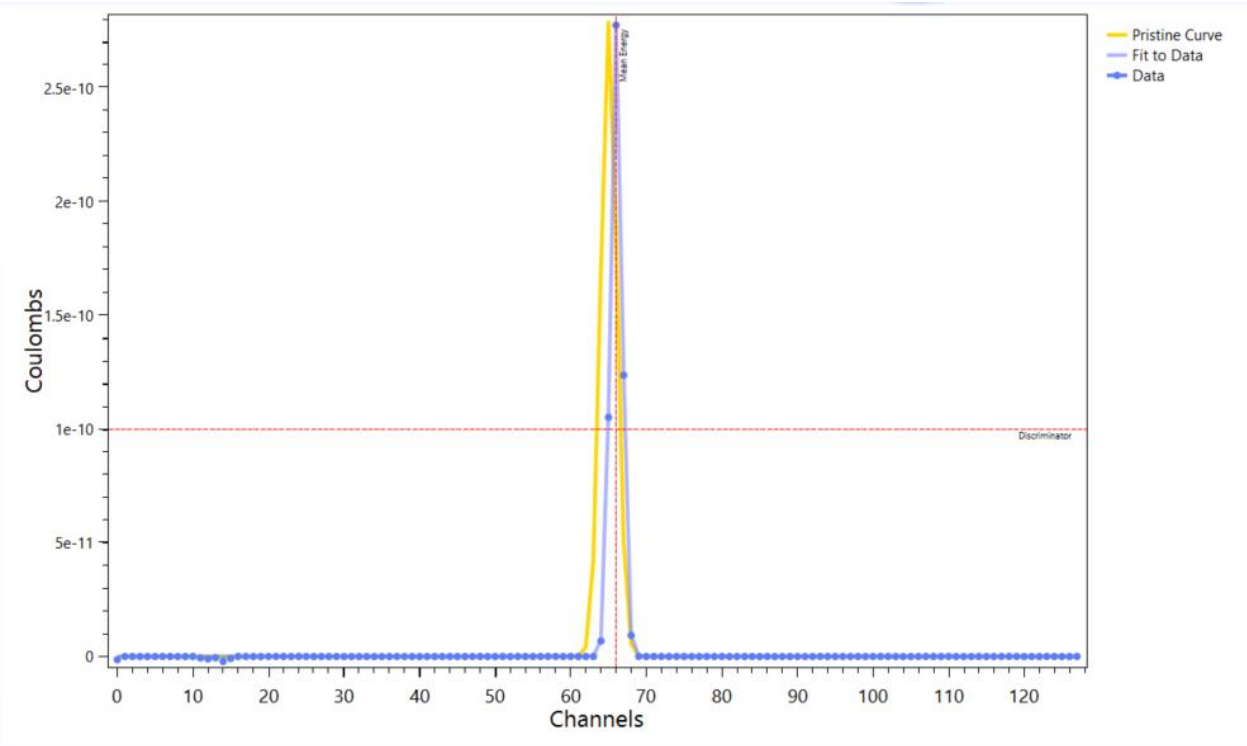
3.1.2. Clear Beam Zeroing

Beam zeroing information can be cleared if you wish to remove the background collection that is currently being used. **Note**: this will remove all beam zeroing information that is stored in the database.

1. Click the "Clear" button next to the "Zero Beam" button on the start page

2. Click on "Ok"

3.2. Plot Features

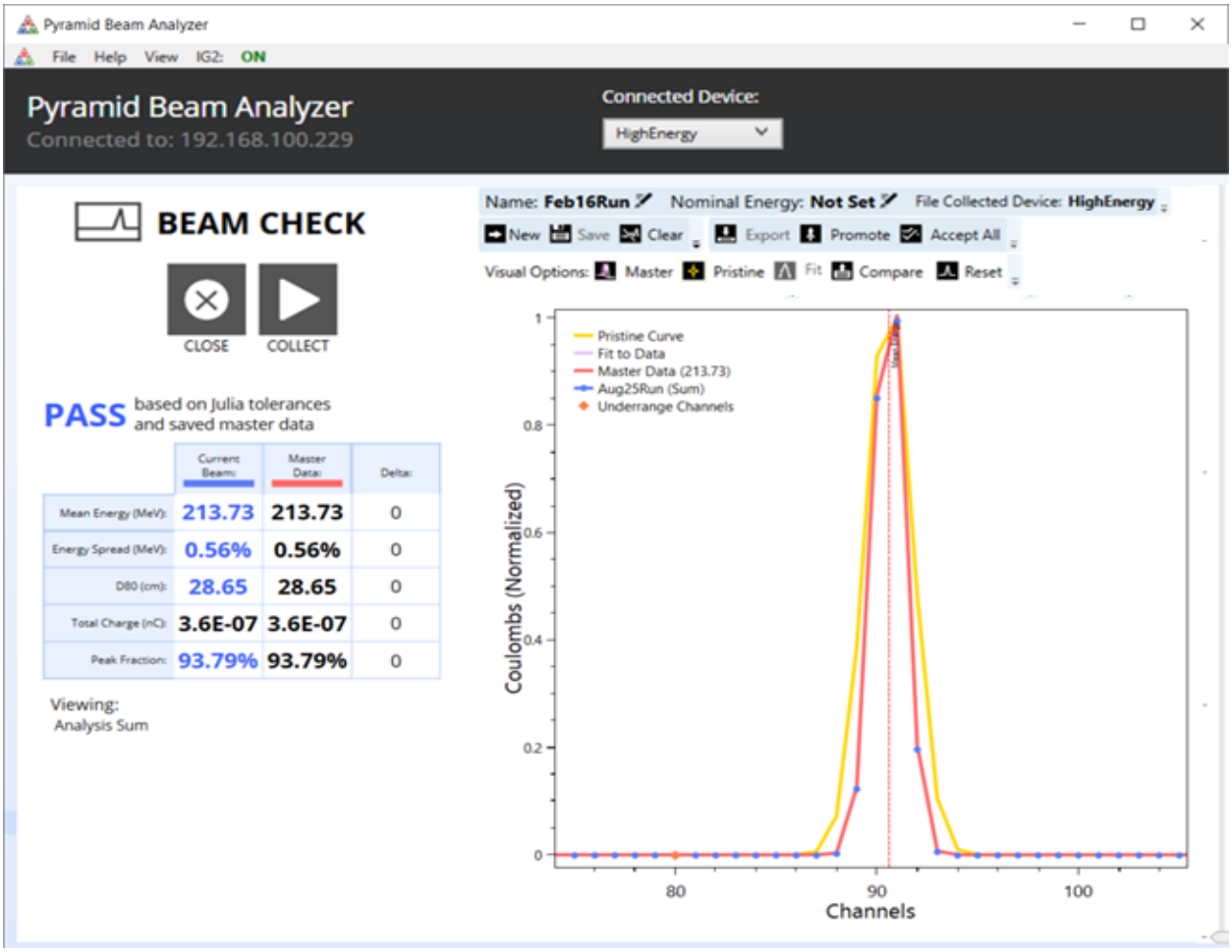


During beam check, you will see a live plot of incoming data. This represents the data from the MLRV and is shown on a graph of MLRV Channels (x axis) versus Coulombs (y axis). This plot will show data even if collection is paused, this doesn't mean that PBA is saving the incoming data. Data is only being recorded when collection is started. The colors in the table below are based on the graph above, but may change depending on visual settings.

PLOT PART	LOOK IN SAMPLE	MEANING
Data	Dark blue dots	Live data points incoming from the connected MLRV.
Fit to Data	Light blue line	Calculated fit to the data points.
Pristine Curve	Yellow line	Calculated perfect curve based on inputted nominal energy.
Discriminator	Red horizontal dotted line	Represents the discriminator value set up in the active tolerance set. Any incoming data with a peak below this line is not accepted as a valid data set.

Mean Energy	Red vertical dotted line	Represents the calculated mean energy value based on incoming data
Overrange/Underrange Channels	Red or orange diamond 	Represents an incoming data that was flagged as over or under range by the I128

3.3. Beam Check

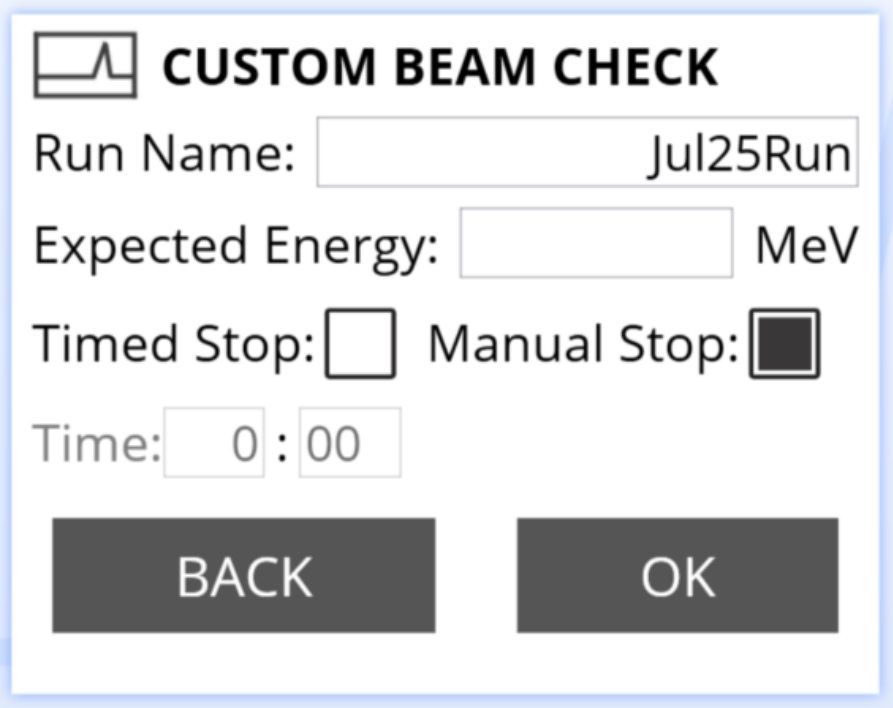


3.3.1. Start a Beam Check

A custom energy beam check allows you to run a beam check with custom parameters that haven't been predetermined by a set routine. To begin a custom beam check follow the instructions below.

1. Click "Beam Check"
2. Click "Custom Beam Check"

You will be provided with the following screen with options described in the table below.



OPTION	MEANING	UNITS
Run Name (*required and unique)*	Unique identifier name for beam check that will be used to retrieve results in a later search	
Expected Energy (*optional)*	Represents the expected nominal energy from this run. Determines the "pristine peak" used later in analysis.	MeV
Timed Stop (*optional)*	A timed stop will run the collection for the predetermined time, then stop.	Minutes : Seconds
Manual Stop (*optional)*	A manual stop will can be started and stopped at the user's will regardless of time.	

1. Click on "Ok"
2. Collection will begin once you press "Start"

3.3.2. Pause Collection

If you have run a "timed stop" collection, you cannot pause since it is time based. You may cancel collection by pressing the "Close" button. Otherwise, use the following instructions to pause.

1. Click the "Pause" button or press the space bar

3.3.3. Resume Collection

When collection is paused, you may resume collection at any time. The pause button becomes a resume button.

1. Click the "Resume" button

Keyboard shortcut: Space

3.3.1. Close a Beam Check

Once finished, press the "Close" button to return to the previous screen. If data has not been saved, PBA will warn you before closing.

3.4. Tool Bar

The top toolbar shows information about the current beam check, including name, nominal energy, and the device on which the data was or is being collected.

3.4.1. Name and Changing the Name

The name of the run is how the beam check data set will be saved and retrieved.

To change the name of the current beam check, or to edit the name of a beam check you are reviewing, click the [ ] button to the right of the current run name, enter a new name, and click Ok.

Note: The new name must be unique and cannot be a name that is already being used by a previously saved beam check data set.

3.4.2. Nominal Energy and Changing Nominal Energy

The nominal energy value is used for purposes of the pristine peak, and for determining which master data set the current data should be compared with.

To change the nominal energy of the current beam check, or to edit the nominal energy of a beam check you are reviewing, click the [ ] button to the right of the current nominal energy, enter a value, and click Ok.

3.4.3. New


The next button tool will close and save the current beam check, clear it, and proceed to a new file by prompting for a new name. This tool allows for fast progression through a set of beams.

Keyboard Shortcut: Ctrl + N

3.4.4. Save


To save the data that has been collected and accepted, press the save button. This will use the run name given at the start of collection. If you change the name of the collection, it will also change the name of the save file and overwrite the existing file. If you close out before saving, PBA will warn you of the action.

Keyboard shortcut: Ctrl + S

3.4.5. Clear Collected Samples


You may wish to clear the currently selected samples in order to continue with a fresh beam check. To clear all currently collected samples, follow the instructions below.

1. Click the "Pause" button if not already paused
2. Click the "Clear" button
3. Click on "Ok"

Keyboard shortcut: Ctrl + X

3.4.6. Save As


Save As, located under the click more button, will offer a dialogue to enter in a new name for the save file. This will create two files instead of overwriting the original. If you have changed the name of the file already, it will not prompt you again.

Keyboard shortcut: Ctrl + Shift + S

Note: Save as option is hidden under the first drop down of the toolbars.

3.4.7. Export to Csv

If you want to save all individual sample data before saving, you must export to a .CSV file. Use the following instructions to export to .CSV. **Note**: this action must be performed before saving and closing.

1. Click on "Export"
2. Located desired save location
3. Click on "Ok"

Note: If you export after saving and closing, the data will export but will lose all individual sample information.

3.4.8. Promote to Master Set

If a beam check is promoted to master data, it will be used as the reference point for other beam checks taken of the same nominal energy. To promote a beam check to a master set, follow the instructions below.

1. Run a beam check
2. Click on "Analyze" or wait for beam check to finish if timed
3. Click on the "Promote" button

If a nominal energy was given at the start of beam check, PBA will request to save the master data under the given energy. If you do not wish to save the master data under that energy, click on "No" during this option.

If no nominal energy was given at the start of beam check, PBA will request to save the master data under the calculated nominal energy.

4. Click on "Ok"
5. Enter admin user credentials

Note: If master data already exists for the given nominal energy, you will be prompted to overwrite this data with the new data.

3.4.1. Accept All

Accept all is a toggle-able option, by default this option is always off. When turned on, every sample collected will be accepted, regardless of whether it has an acceptable fit or if it passes the set discriminator tolerance.

3.4.2. Visual Quick Access Buttons

The visual quick access buttons allow you to easily toggle on and off certain parts of the plot. They will assume color coding depending on your visual settings.

ICON	TOGGLE	KEYBOARD SHORTCUT
	Master data set	M
	Pristine curve	P
	Fit to data	F

3.4.3. Compare to Another Beam Check

Compare gives you the option to overlay a previously collected data set. This will overlay the selected set on the same graph. When you compare the data, the analysis table on the left will change from comparing to a master data set to the set that you chose instead.

1. Click the "Compare" button
2. Search and select the desired comparison data
3. Click "Compare"

Keyboard shortcut: Ctrl + C

Note: To clear a comparison, click the "Clear" button

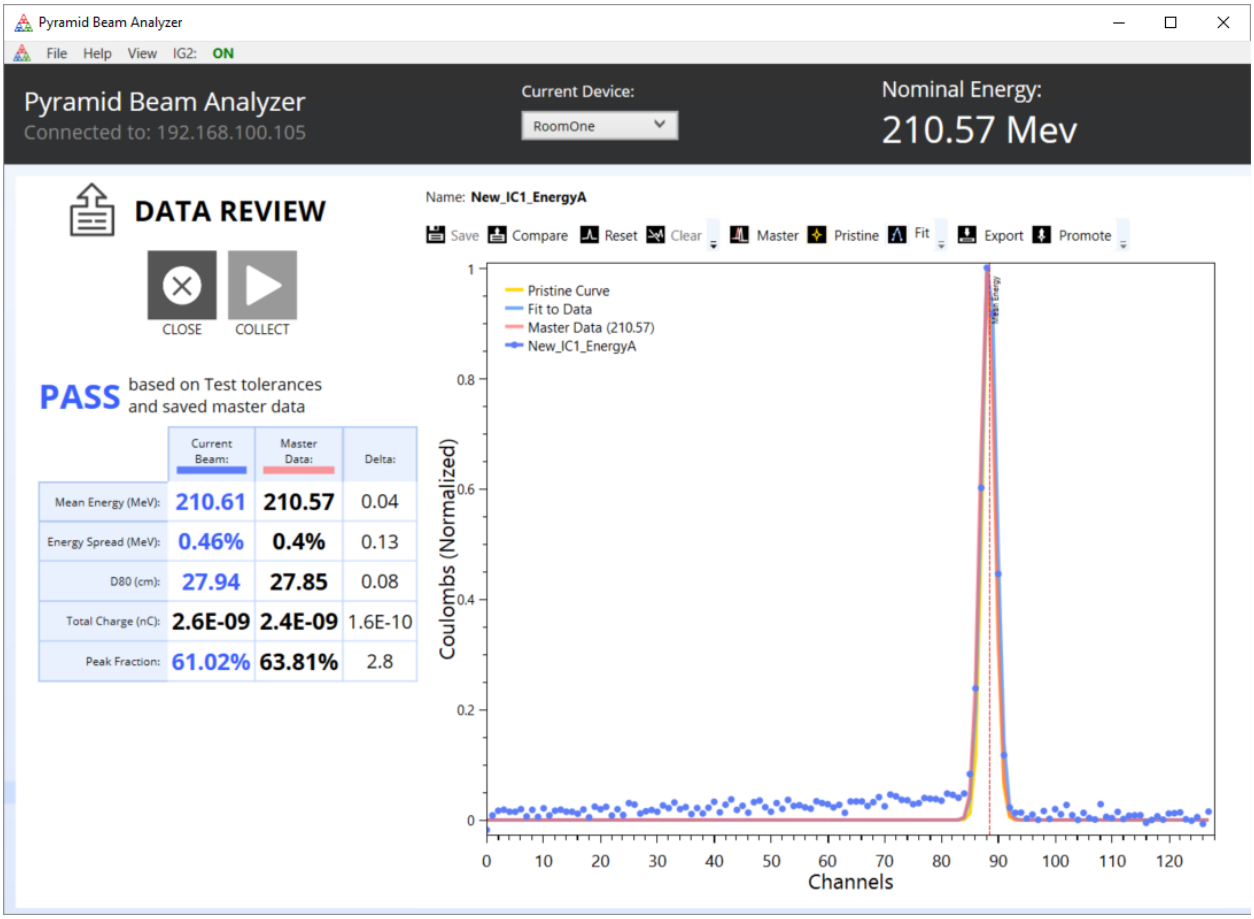
3.4.1. Reset the Plot

will reset the plot to its original format, including its default zoom. It will also remove any compared data sets from the view.

Keyboard shortcut: Esc

3.5. Beam Analysis

Once satisfied with the collected samples, the next step is to analyze and review the samples taken. To analyze the data, simply pause the collection. Beam analysis will provide a table of calculated results, show a sum of the data on the plot, and allow you to look through all collected samples.

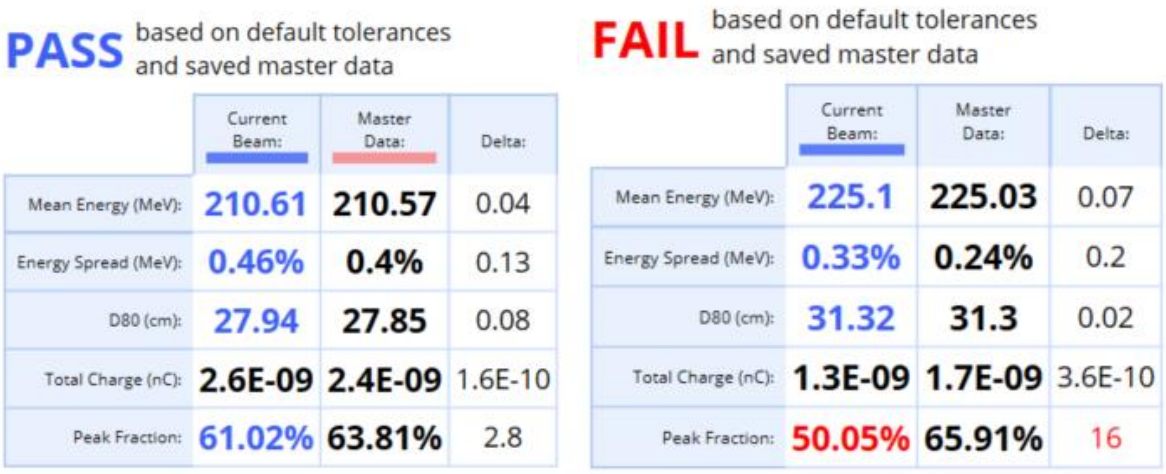


3.5.1. Analysis Table

The analysis table shown below provided during beam analysis shows the current beam check "Current Beam" on the left column next to "Reference Data" on the right. Reference data is taken from a previously saved beam check for the same nominal energy that was promoted to master status. The two beam checks are compared and the results of the comparison decide if the beam check will "Pass" or "Fail". The parameters under the current beam pass and fail according to the set up active tolerance table values.

If a parameter fails, the text will be red. Mouse-over the reference data value to see what tolerance value is currently being used.

The rightmost column shows the delta between the master data and current beam.



ROW	MEANING	UNITS
Mean Energy	Calculated mean energy of the data collected	MeV
Energy Spread	Calculated energy spread difference between theoretical pristine curve and collected data	MeV %
D80	Calculated distance equivalent in water (approximate)	cm
Total Charge	Total charge of collected data	Nano coulombs (nC)
Peak Fraction	Perfect of charge under the peak curve	nC %

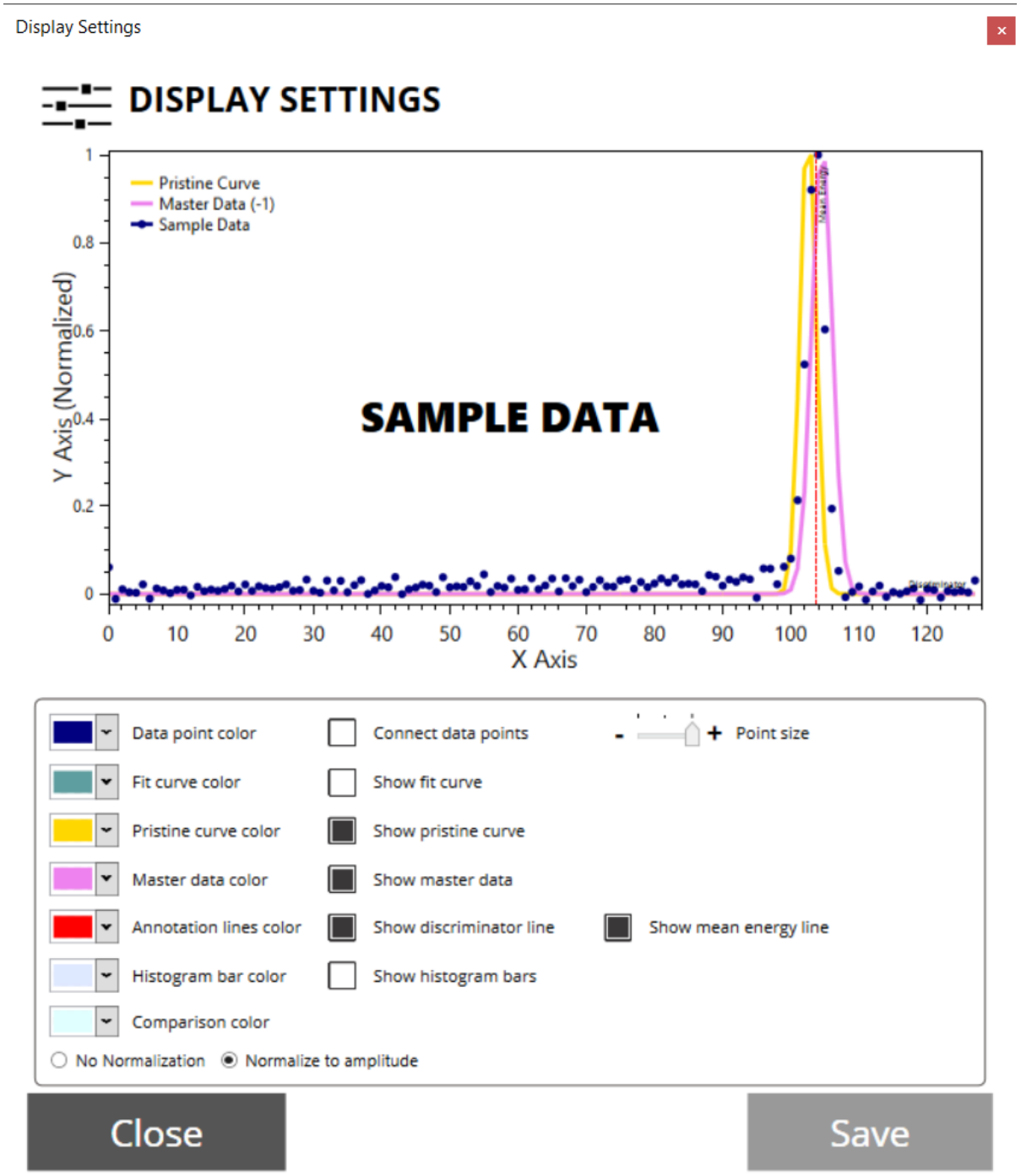
3.5.2. Review Collected Samples

To review collected samples, use the slider tool located on the right-hand side of the plot. Moving this slider will go to the corresponding sample taken. The label on the left-hand side "Viewing:" will reflect which sample is currently being looked at. To return to the analysis sum view, slide the slider to the very bottom.

Note: This feature is not available when reviewing from the database, only during live acquisition time.

3.6. Display Settings

Display settings affect the look of the plot graph during beam checks. These settings may be changed to user preferred settings. The display settings menu has a live view of the changes as you make them. Changes will not go into effect until you save them using the "Save" button.



3.6.1. Change Display Settings

You may access visual settings anytime via the top menu, which means you may change visual settings in the middle of collection if desired. To change visual settings, follow the instructions below.

1. Click on "Visual Settings" on the start page

   Or

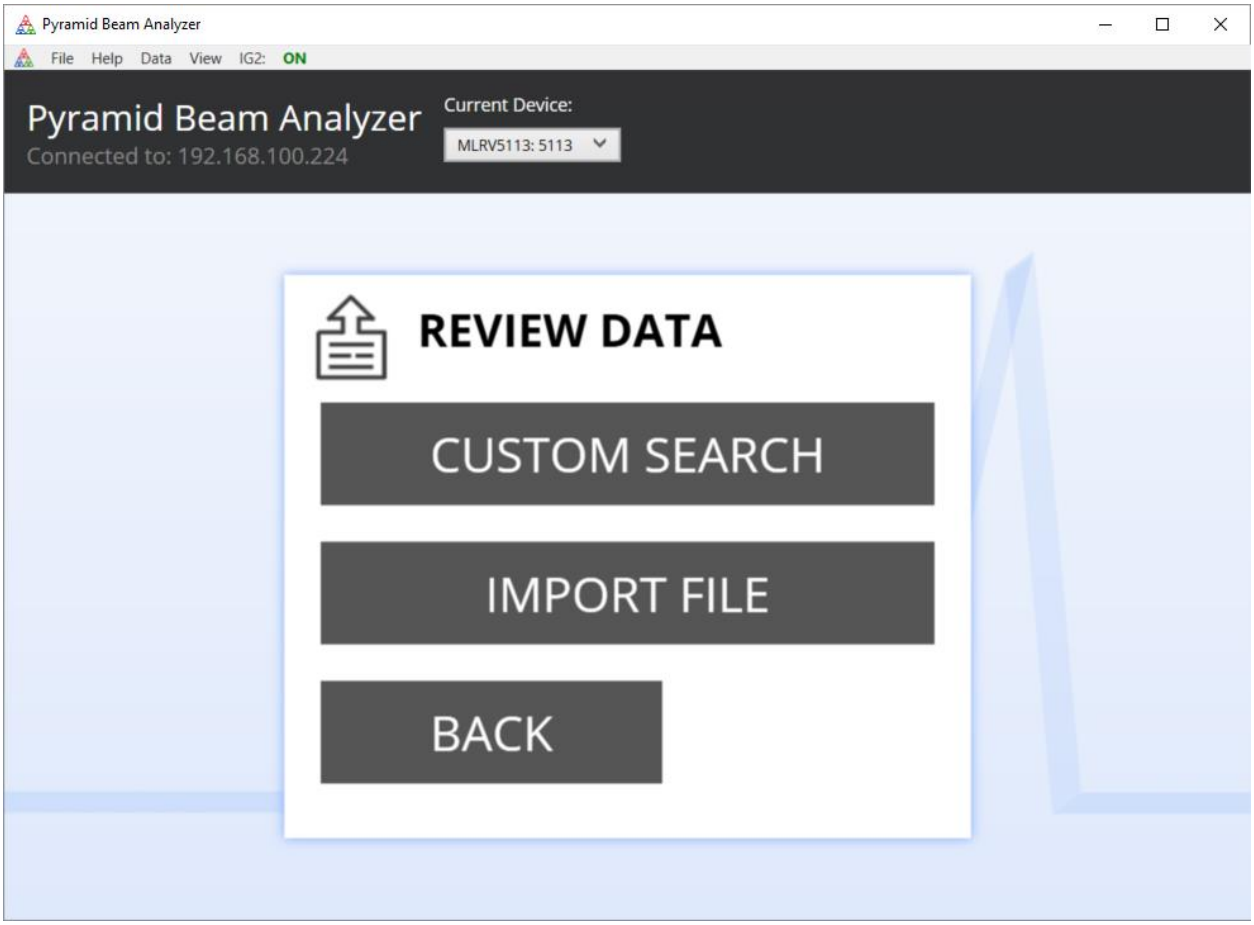
1. Click the "View" menu option
2. Click on "Visual Settings"

Keyboard Shortcut: Ctrl + K

SETTING	EFFECT
Data point color	Changes the color of the main data points during collection. Shown as blue dots on the visual above.
Connect data points	Data points are connected via a line of the same color as the points.
Point size	Changes the size of the data point circles.
Fit curve color	Changes the color of the calculated Gaussian fit curve.
Show fit curve	Shows the best fit to the data.
Pristine curve color	Changes the color of the calculated pristine curve.
Show pristine curve	Shows the ideal "pristine" curve, assuming no energy spread.
Annotation lines color	Changes the color of annotations (discriminator line, mean energy line).
Show discriminator line	Shows the discriminator value, the current below which a peak is not detected.
Show mean energy line	Shows the position of the fitted mean energy.
Histogram bar color	Changes the color of histogram bars.
Show histogram bars	Plots histogram bars under the data points.
Normalize to amplitude	The plot will force all curves to have a height of 1

Section 4

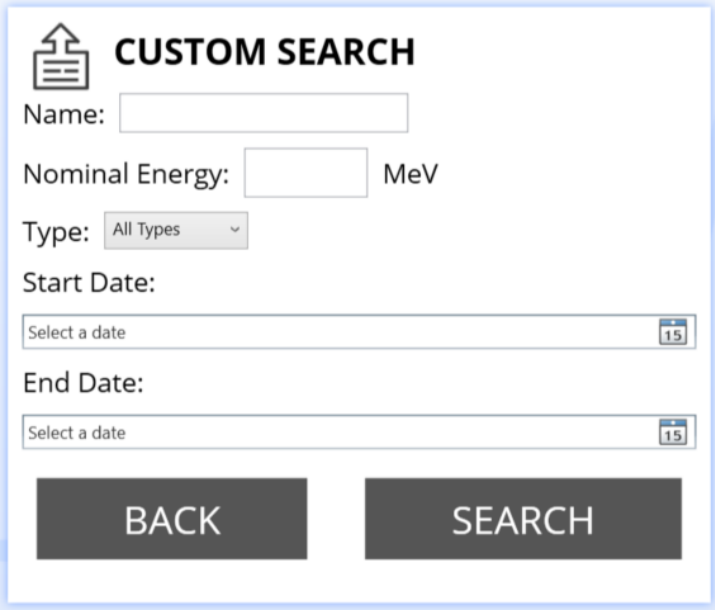
4. Review Data



The review data page allows you to search previously

- Custom Search – Use parameters such as name, nominal energy, data type, and date range to find previously collected data
- Import File – Import a data file into PBA that was exported from the program before, or is in I218 format

4.1. Perform a Custom Search



A custom search may be used to find previously collected data sets. All parameters are optional and may be left blank. To perform a custom search, follow the instructions below.

1. Click on "Review Data" on the start page
2. Click on "Custom Search"
3. Enter desired search parameters
4. Click on "Search"

SEARCH TERM	MEANING	UNITS
Name	Search will look for beam sets with names that include the search term.	
Nominal Energy	Search will look for beam sets with nominal energies that match the entered value.	MeV
Type	Data set type.	Normal, Master Set, or Background
Start Date	Collection date range start at which results will be included.	

End Date	Collection date range end at which results will be included.	

4.2. Delete a Data Set

To delete a dataset from the database completely, first perform a search and locate the file you wish to delete, then follow the instructions below.

1. Right click on the data set you wish to delete (or, ctrl + shift to select multiple)
2. Click "Delete selected files"

Note: If one of the data sets you are trying to delete is a master set, you will be required to enter admin credentials

3. Click "Ok"

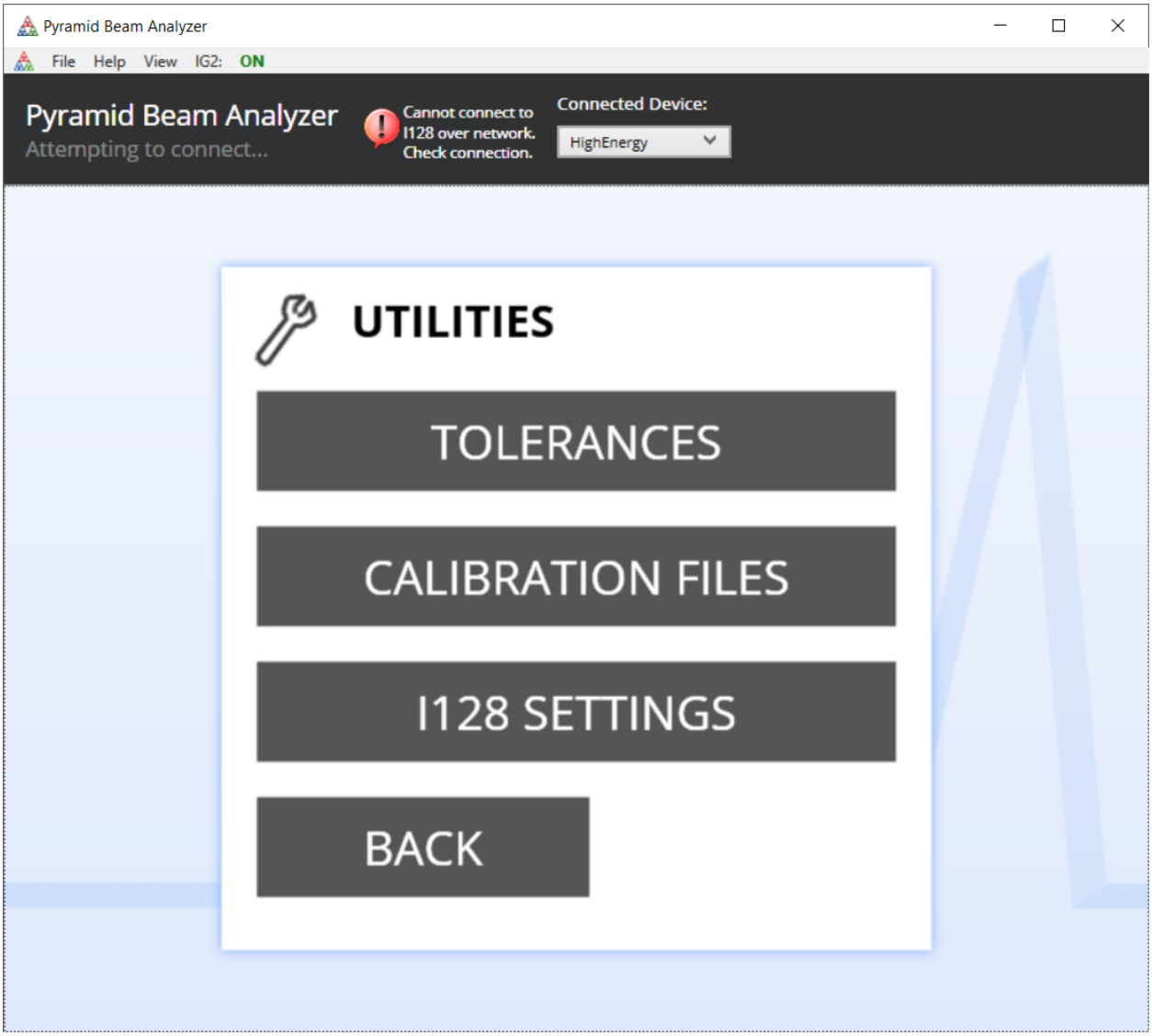
4.3. Import and Review from .CSV

Once exported, the created file may be opened for review. Unlike a normally saved set, this file will allow you to review every sample taken in the set.

4. Click on "Review Data" on the start page
5. Click on "Import File"
6. Locate saved .CSV file
7. Click on "Open"

Section 5

5. Setup & Utilities



The utilities page is a password protected area where setup files and program options are set.

- Tolerances – Change tolerance settings for in application data analysis results

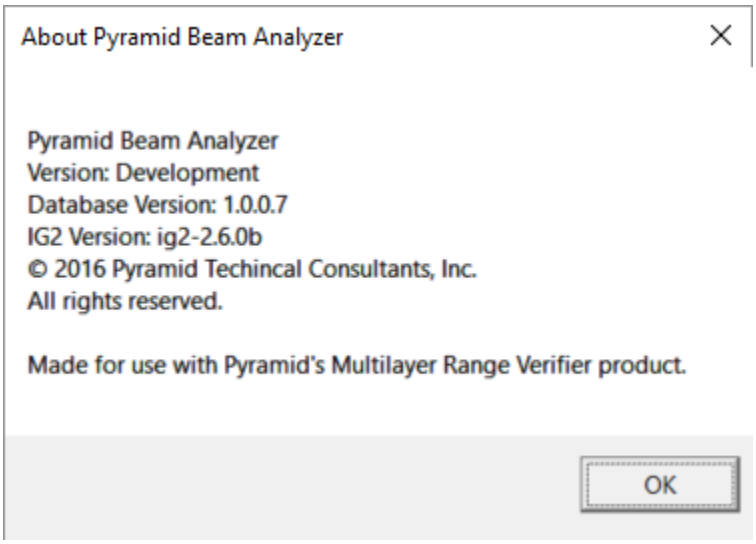
- Calibration Files – Manage MLRV calibration files
- I128 Settings – Change I128 settings

5.1. About PBA

To access information such as your current PBA version, follow the instructions below.

1. Click the "Help" menu option
2. Click on "About"

In this example, the version is labeled "Development". This is where your current version number will be located.



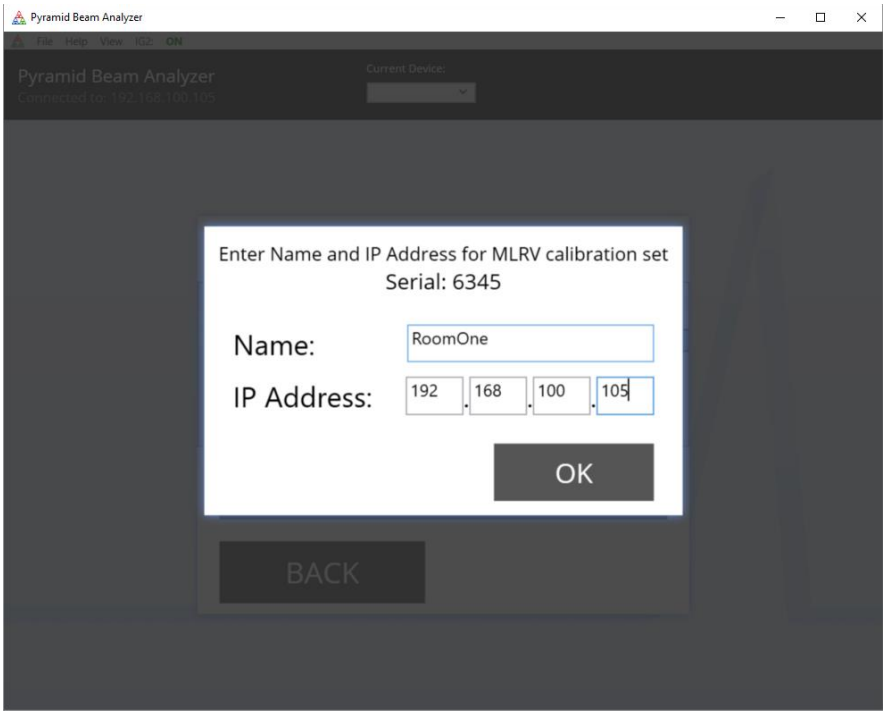
5.2. Calibration Files

5.2.1. Add a MLRV Calibration File

Every MLRV device comes packaged with a unique calibration file. Without this calibration file, or if using a calibration file for a different MLRV, PBA cannot be accurate. You may add multiple calibration files and switch between them at any time using the drop down at the top of the screen under "Current Device". To add a new calibration file follow the instructions below.

1. Click on "Utilities" on the start page
2. Login using the administrative username and password

3. Click on "Calibration Files"
4. Click on "Add Calibration File"
5. Locate your Calibration file (Note: must be called MLRV####.csv)

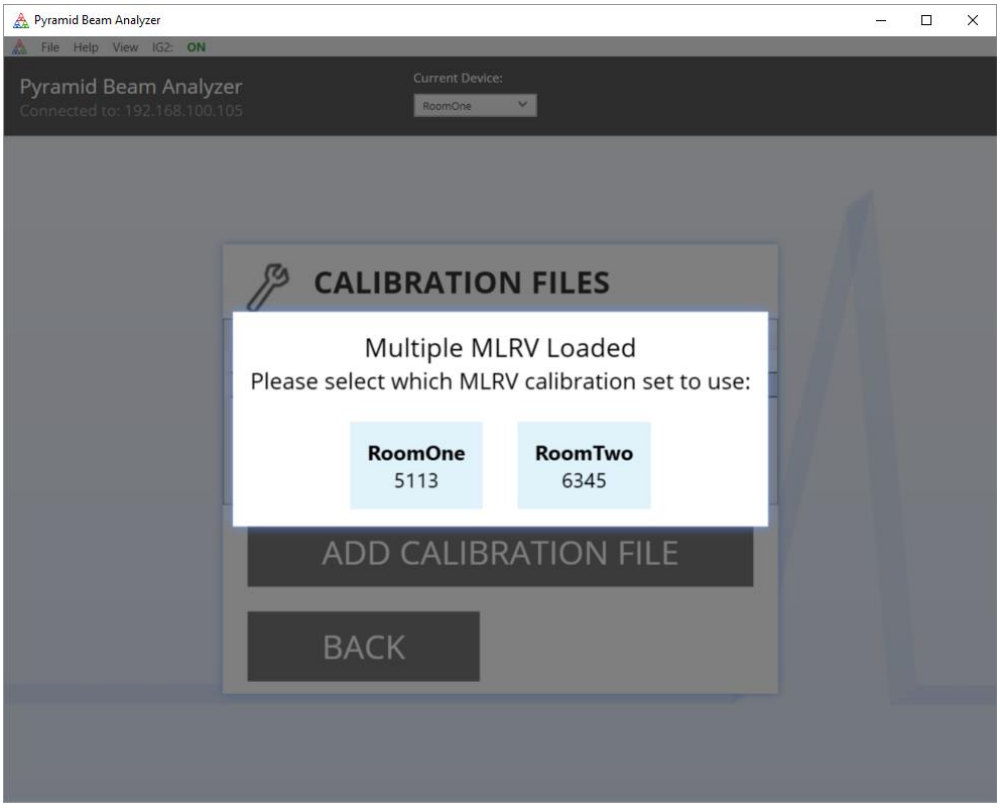


6. Enter an identifying name and an IP address location of the connected I128

If successful, you will see the new calibration file added to the table of calibrations. Otherwise, an error will occur which means something was wrong with the file given, most likely the expected formatting was off. If you modify your file, PBA may not be able to read it and will not give accurate data.

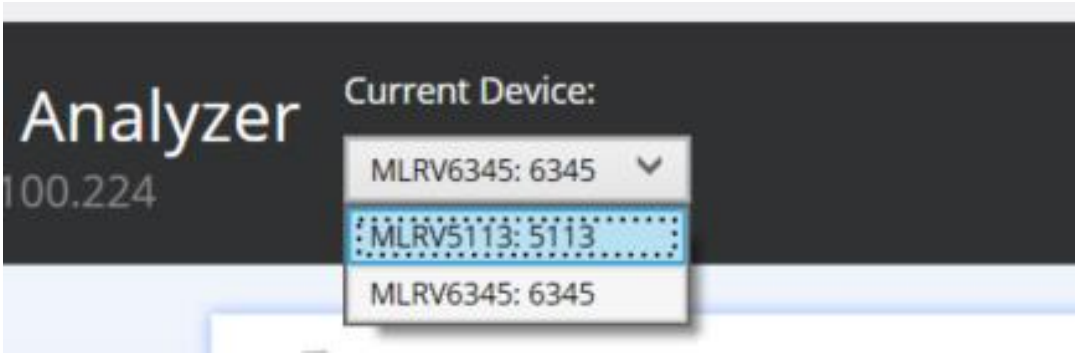
5.2.2. Using Multiple Calibration Files

Whenever PBA starts up, or calibration files are added or removed, the application will require that you choose which set to use. It will show you all options, with their entered names and serial numbers. To choose, click the desired calibration set.



5.2.3. Change Current Device Calibration Set

To change which calibration set is currently by PBA, use the dropdown menu at the top banner to select the desired device via serial number as shown in the example below.



5.2.4. Remove a Calibration File

To remove an MLRV calibration file, follow the instructions below.

1. Click on "Utilities" on the start page

2. Login using the administrative username and password
3. Click on "Calibration Files"
4. Select the calibration file/s you wish to remove
5. Click on "Delete Calibration Set"
6. Click on "Yes"

5.2.5. Rename a Calibration File

Changing the name of the calibration file will affect its name everywhere you see it; on the top bar, and on the calibration files table.

1. Click on "Utilities" on the start page
2. Login using the administrative username and password
3. Click on "Calibration Files"
4. Double click on the name you wish to change
5. Enter new name
6. Press Enter

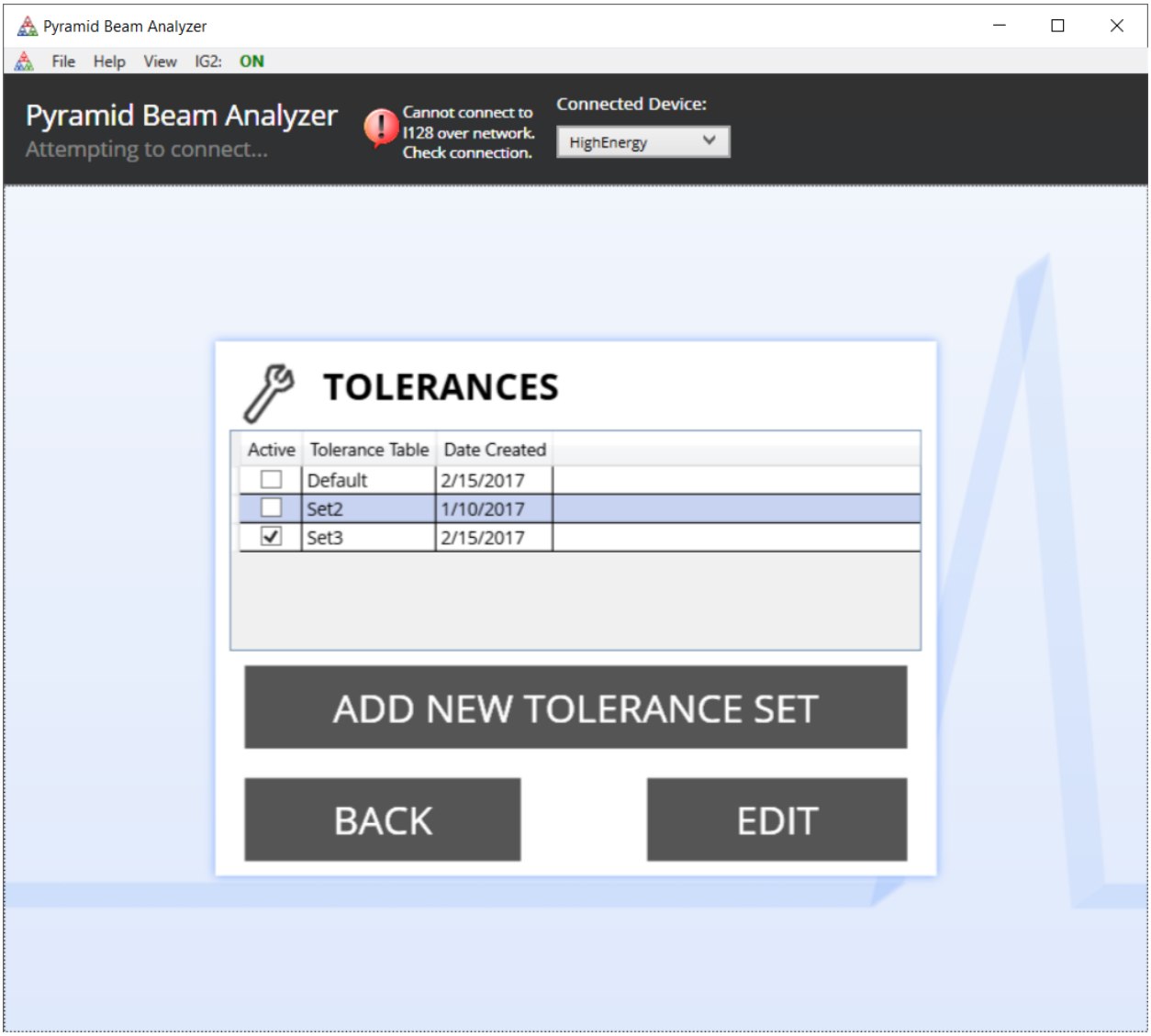
5.2.6. Change the IP Address of a Calibration File

1. Click on "Utilities" on the start page
2. Login using the administrative username and password
3. Click on "Calibration Files"
4. Double click on the name you wish to change
5. Enter new IP address with correct formatting (0.0.0.0)
6. Press Enter

If the IP Address does not change, the entered value was not in the correct format.

5.3. Tolerances

Tolerances are editable values that affect the Pass or Fail results of data taken. There are also a few options that change the way background zeroing is required before beam check is possible. Access the tolerances through the Utilities menu and clicking the Tolerances option. PBA has a default set of tolerances that affect the data analysis results and other things within the program. Although you cannot modify the default set, you may add a new set of tolerances or change the active tolerance set by following the instructions in the following sections.



The following table describes the different values that can be changed in a tolerance table. If a tolerance is left empty, or given the value -1, it will not be used or required for the pass/fail value of a beam check.

TOLERANCE	MEANING	UNITS
Zeroing Refresh	Time allowed between a background offset collection in which a collection is considered acceptable	Hours
Zeroing Period	Time duration to collect background information	Minutes
Discriminator	Low value at which a beam peak will not be considered a valid sample	Amps
Delta Mean Energy	Allowed tolerance in delta between sample data and saved master reference data for the same nominal energy	MeV
Delta Energy Spread	Allowed tolerance in delta between sample data and saved master reference data for the same nominal energy	MeV
Delta Total Charge	Allowed tolerance in delta between sample data and saved master reference data for the same nominal energy	%
Delta Peak Fraction	Allowed tolerance in delta between sample data and saved master reference data for the same nominal energy	%
Active Set	An active set will have a check mark next to its name in the list of tolerance sets. An active set is the set that will be used.	

5.3.1. Add a New Tolerance Set

1. Click on "Utilities" on the start page
2. Login using the administrative username and password
3. Click on "Tolerances"
4. Click on "Add New Tolerance Set"
5. Give your tolerance set a unique name
6. Fill in changes to the default tolerance set
7. Check off the "Make this set active" checkbox
8. Click on "Save"

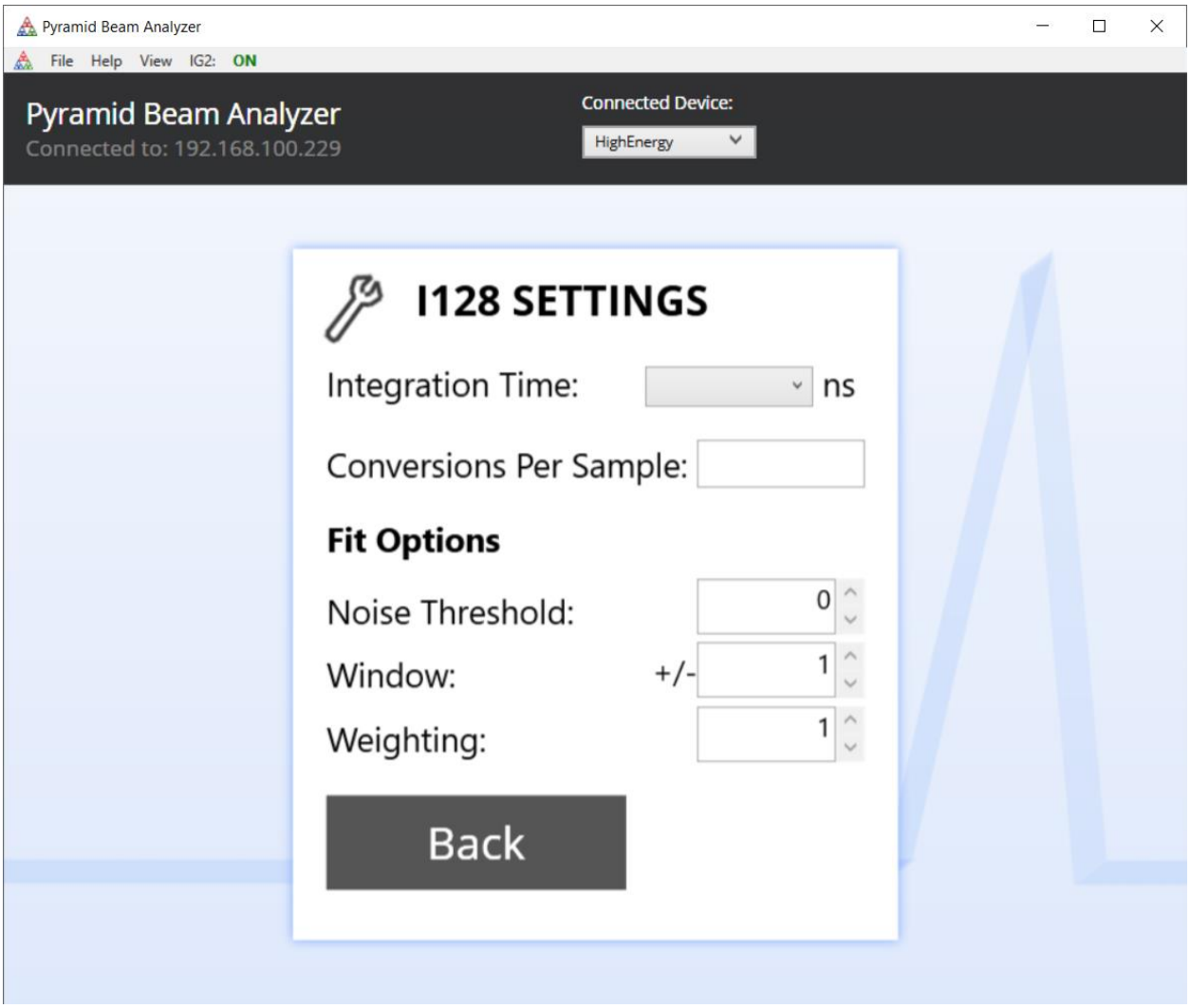
Note: To ignore any of the tolerances, leave the field blank or enter a -1

5.3.2. Remove a Tolerance Set

To remove a tolerance set follow the instructions below. **Note:** you cannot remove the default tolerance set. If you remove a tolerance set that was the active set, PBA will make the default tolerance set active.

1. Click on "Utilities" on the start page
2. Login using the administrative username and password
3. Click on "Tolerances"
4. Click on the tolerance set you wish to delete
5. Click on "Edit"
6. Click on "Delete Set"
7. Click on "Yes"

5.4. I128 Settings



Certain settings are made available through PBA that affect your I-128 directly. PBA will notice if certain settings are not within recommended standards, and provide an option to set them to the recommended settings. If you have the need to change any of these options manually however, you may do so in the I128 Settings screen.

These settings are normally set to the default values:

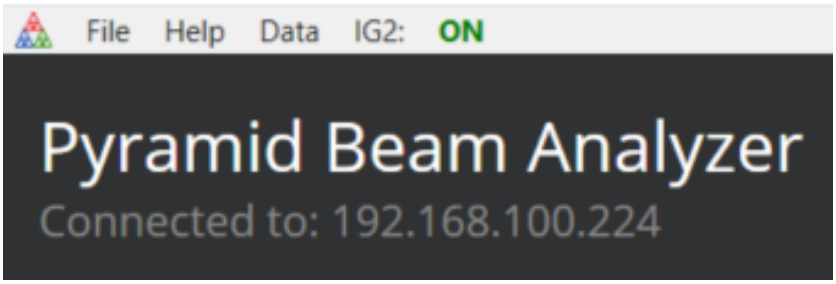
Integration Time This is the core time interval over which each data point is collected. Normally set to 1,000,000 ns (1 ms)

Conversions per sample The core acquisition rate is then averaged for a longer time internal. Normally set to 250 averages, resulting in an acquisition time of 0.25 seconds.

Certain more advanced I-128 features are available, which can be accessed through direct access through the ***PTC Diagnostic***, software. See the Pyramid website to download the diagnostics, and to access the user manual for the I-128.

5.5. Problems with IG2?

IG2 is the background process that runs and connects PBA to the I128 device attached to your MLRV. If IG2 is not running, then PBA cannot talk to your device. IG2 needs a system.xml file to work. Since IG2 is vital for use, PBA will not allow you to attempt to run a beam check or to zero beam without an IG2 connection.



The connection status of IG2 is always shown on the topmost toolbar. The example above shows that IG2 is "on" otherwise the status indicator will show "off". PBA checks for an IG2 connection, and if IG2 was terminated, it will ask you to restart and do so automatically.

Once IG2 is running with a valid system.xml configuration file, the IP address bar shown above will read "Connected to:" followed by the **IP address of your I128**.

5.5.1. Start IG2

If IG2 is not running for some reason, indicated by the top bar indication, you may start it manually in application. To do so, follow the instructions below. **Note:** this option is not available if IG2 is already running.

1. Click the "IG2:" menu option
2. Click on "Start IG2"

5.5.2. Run IG2 as a Visible Process

IG2 runs hidden in the background by default. Since viewing the IG2 console can be useful for debugging connection issues, there is an option to run IG2 as a visible process. To toggle this option, follow the instructions below. **Note**: this will restart your IG2 process.

1. Click the "IG2:" menu option
2. Toggle "Run IG2 hidden in background"
3. Click on "Ok"

Section 6

6. Installing PBA Manually

Yellow Notice Bubble: This bubble icon indicates that something is missing from PBA that requires your attention. This may be a file, such as a calibration file, an I128 configuration file, or background collection. Hover your mouse over the icon for more information in-application for how to remedy the problem.

To begin installation, you will be given an install package .zip or an installation CD. If your CD does not start automatically on insert, or you have a .zip file, follow the following steps for installation.

1. Unzip .zip file to a location on your computer
2. Open the startup.exe file
3. Follow on screen instructions to accept EULAs and install PBA

6.1. Network Setup

To connect to Pyramid I128 devices, you must take the following network steps to create a static IP address.

1. Right click on your windows icon
2. Click "Network Connections"
3. Right click on your current network connection
4. Click "Properties"
5. Select "Internet Protocol Version 4 (TCP/IPv4)"
6. Click "Properties"

7. Click "Use the following IP address" option (if it's not already set)
8. Give your computer a static IP
9. Click "Ok"

6.2. Automatically Locate Setup Files

If it is your first time installing PBA, you will be prompted to locate the calibration file needed for the program. If you were given an installation folder or CD, take the following steps to let the program automatically find that file for you.

1. Click on "Locate Files"
2. Find the CD folder or extracted .zip folder
3. Click on "OK"

If PBA cannot locate any of the setup files expected, you will receive a message saying "PBA could not find the following files in the location given." The missing files will have to be added by hand by following the next instructions. You will also have to do this if you choose the option "Add Later" instead of "Locate Files".